```
=> tissue culture
  18 FILES SEARCHED...
L1      328263 TISSUE CULTURE

=> ginseng
L2       27532 GINSENG

=> l1 and l2
L3         988 L1 AND L2

=> bioreactor
L4       89876 BIOREACTOR

=> l3 and l4
L5          79 L3 AND L4

=> dup rem l5
DUPLICATE IS NOT AVAILABLE IN 'BIOCOMMERCE, FEDRIP, FOREGE, GENBANK,
INVESTEXT'.
ANSWERS FROM THESE FILES WILL BE CONSIDERED UNIQUE
PROCESSING COMPLETED FOR L5
L6           46 DUP REM L5 (33 DUPLICATES REMOVED)

=> l6 and py<= 2000
   1 FILES SEARCHED...
   3 FILES SEARCHED...
   5 FILES SEARCHED...
   9 FILES SEARCHED...
'2000' NOT A VALID FIELD CODE
'2000' NOT A VALID FIELD CODE
'2000' NOT A VALID FIELD CODE
  18 FILES SEARCHED...
  23 FILES SEARCHED...
  25 FILES SEARCHED...
  28 FILES SEARCHED...
L7          25 L6 AND PY<= 2000

=> d l7 IBIB ABS 1-25

L7   ANSWER 1 OF 25  AGRICOLA
ACCESSION NUMBER:         2001:43714  AGRICOLA
DOCUMENT NUMBER:          IND22792518
TITLE:                    Pilot-scale culture of adventitious roots of
                          ginseng in a bioreactor system.
AUTHOR(S):                Choi, S.M.; Son, S.H.; Yun, S.R.; Kwon, O.W.; Seon,
                          J.H.; Paek, K.Y.
AVAILABILITY:             DNAL (QK725.P53)
SOURCE:                   Plant cell, tissue and organ culture, 2000.
                          Vol. 62, No. 3. p. 187-193
                          Publisher: Dordrecht, The Netherlands : Kluwer
                          Academic Publishers.
                          CODEN: PTCEDJ; ISSN: 0167-6857
NOTE:                     Includes references
PUB. COUNTRY:             Netherlands
DOCUMENT TYPE:            Article
FILE SEGMENT:             Non-U.S. Imprint other than FAO
LANGUAGE:                 English
AB   A pilot-scale culture of multiple adventitious roots of ginseng
     was established using a balloon-type bubble bioreactor.
     Adventitious roots (2 cm) induced from callus were cultured in plastic
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Petri dishes having 20 ml of solid Schenk and Hildebrandt (1972) medium containing 3% sucrose, 0.15% gelrite, and 24.6 micromolar indole-3-butric acid. An average of 29 secondary multiple adventitious roots were produced after 4 weeks of culture. These secondary roots were elongated on the same medium, reaching a length of 5 cm after 6 weeks of culture. A time course study revealed that maximum yields in 5-l and 20-l **bioreactors** were approximately 500 g and 2.2 kg at day 42 with 60 g and 240 g inoculations, respectively. Cutting twice during the culture increased the total amount of biomass produced. The root biomass in a 20-l balloon-type bubble **bioreactor** was 2.8 kg at harvest with 240 g of inoculum after 8 weeks of culture. The total saponin content obtained from small-scale and pilot-scale balloon type bubble **bioreactors** was around 1% based on dry weight. Inoculation of 500 g fresh weight of multiple adventitious roots into a 500 l balloon-type bubble **bioreactor** with cutting at 4 and 6 weeks after inoculation produced approximately 74.8 kg of multiple roots. The ginsengnoside profiles of these multiple adventitious roots were similar to profiles of field-grown **ginseng** roots when analyzed by HPLC.

L7 ANSWER 2 OF 25 AGRICOLA
ACCESSION NUMBER: 2000:11617 AGRICOLA
DOCUMENT NUMBER: IND22026981
TITLE: Production of **ginseng** and its bioactive components in plant cell culture: current technological and applied aspects.
AUTHOR(S): Wu, J.; Zhong, J.J.
CORPORATE SOURCE: Hong Kong Polytechnic University, Kowloon, Hong Kong.
AVAILABILITY: DNAL (QH442.J69)
SOURCE: Journal of biotechnology, **Feb 19, 1999.** Vol. 68, No. 2/3. p. 89-99
Publisher: Amsterdam, The Netherlands : Elsevier Science B.V.
CODEN: JBITD4; ISSN: 0168-1656
NOTE: Includes references
PUB. COUNTRY: Netherlands
DOCUMENT TYPE: Article; Law
FILE SEGMENT: Non-U.S. Imprint other than FAO
LANGUAGE: English

L7 ANSWER 3 OF 25 AGRICOLA
ACCESSION NUMBER: 2000:5026 AGRICOLA
DOCUMENT NUMBER: IND22011769
TITLE: In vitro root cultures of Panax **ginseng** and P. quinquefolium.
AUTHOR(S): Kevers, C.; Jacques, P.; Thonart, P.; Gaspar, T.
CORPORATE SOURCE: University of Liege, Liege, Belgium.
SOURCE: Plant growth regulation, **Mar 1999.** Vol. 27, No. 3. p. 173-178
Publisher: Dordrecht : Kluwer Academic Publishers.
CODEN: PGRED3; ISSN: 0167-6903
NOTE: Includes references
PUB. COUNTRY: Netherlands
DOCUMENT TYPE: Article
FILE SEGMENT: Non-U.S. Imprint other than FAO
LANGUAGE: English
AB The paper describes a procedure for the initiation, subculture and continued proliferation of adventitious roots of Panax **ginseng**

and panax quinquefolium, which resemble hairy roots. The technique took advantage of the high powerful activity of a new synthetic auxin: benzo[b]selenienyl acetic acid (BSAA). Such initiation from root explants was dependent upon the season, the type and concentration of auxin. The hairy-like roots of **ginseng** could be subcultured by transfer every 4 weeks to fresh liquid medium either in agitated Erlenmeyer flasks or in **bioreactors**. Optimal conditions for a continued multiplication (up to 14 per month) were determined. The only practical problem was the limitation of the fresh mass as inoculum: the multiplication rate decreased with the increased quantity of roots. It is postulated that a root growth inhibiting substance was released into the media by the proliferating **ginseng** hairy roots.

L7 ANSWER 4 OF 25 AGRICOLA
ACCESSION NUMBER: 94:44030 AGRICOLA
DOCUMENT NUMBER: IND20398464
TITLE: Production of ginsenoside saponins by culturing **ginseng** (Panax **ginseng**) embryogenic tissues in **bioreactors**.
AUTHOR(S): Asaka, I.; Ii, I.; Hirotani, M.; Asada, Y.; Furuya, T.
AVAILABILITY: DNAL (QR53.B56)
SOURCE: Biotechnology letters, **Dec 1993.** Vol. 15, No. 12. p. 1259-1264
Publisher: Middlesex : Science and Technology Letters.
CODEN: BILED3; ISSN: 0141-5492
NOTE: Part 98 of a series. Subtitle: Studies on plant **tissue cultures**.
Includes references
PUB. COUNTRY: England; United Kingdom
DOCUMENT TYPE: Article
FILE SEGMENT: Non-U.S. Imprint other than FAO
LANGUAGE: English
AB **Ginseng** (Panax **ginseng**) embryogenic tissues were cultured in three types of reactors and the ginsenoside productivities in these tissues were compared. As a result, the saponin productivity was the best when an airlift reactor was used, and more than twice of that when a paddle or internal turbine reactor was used. The tissues grew 9 fold during 42 days, and the ginsenoside pattern resembled that of **ginseng** leaves.

L7 ANSWER 5 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 2000:144939 CABA
DOCUMENT NUMBER: 20000315624
TITLE: Somatic embryogenesis of Panax **ginseng** in liquid cultures: a role for polyamines and their metabolic pathways
AUTHOR: Kevers, C.; Gal, N. le; Monteiro, M.; Dommes, J.; Gaspar, T.; le Gal, N.
CORPORATE SOURCE: Plant Molecular Biology and Hormonology, Institute of Botany B 22, University of Liege, Sart Tilman, B-4000 Liege, Belgium.
SOURCE: Plant Growth Regulation, (**2000**) Vol. 31, No. 3, pp. 209-214. 31 ref.
ISSN: 0167-6903
DOCUMENT TYPE: Journal
LANGUAGE: English
AB A callus with embryogenic capacity was generated from root sections of

Panax **ginseng** and used as an inoculum source for embryogenic liquid cultures in a three-step process: (1) a suspension culture of cell aggregates in the presence of an auxin/cytokinin mixture (1 mg/litre benzoselenienyl-3 acetic acid (BSAA) and 0.3 mg/litre kinetin); (2) an induction medium containing auxin only (3 mg/litre BSAA or IAA for 5 to 30 days); and (3) a regeneration medium containing cytokinin only (0.2 mg/litre kinetin or zeatin riboside for one month). Up to 25 embryos were recovered per 2.5 g of aggregates in these conditions. Incorporation of polyamines (putrescine, spermidine or spermine) or their precursors, arginine and ornithine at 10-5 to 10-3 Minto either the induction or regeneration media increased the number of embryos produced by up to 4 times. Inhibitors of both biosynthesis and biodegradation of polyamines reduced the number of embryos. These results support earlier findings of the role of polyamines in the process of somatic embryogenesis. The success of these liquid cultures opens up the possibility of producing somatic embryos of Panax **ginseng** in **bioreactors**.

L7 ANSWER 6 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 2000:22831 CABA
DOCUMENT NUMBER: 20000306720
TITLE: Application of **bioreactor** for the production of saponin by adventitious roots cultures in Panax **ginseng**
AUTHOR: Seon, J. H.; Yoo, K. W.; Cui, Y. Y.; Kim, M. H.; Lee, S. J.; Son, S. H.; Paek, K. Y.; Altman, A. [EDITOR]; Ziv, M. [EDITOR]; Izhar, S. [EDITOR]
CORPORATE SOURCE: Research Center for the Development of Advanced Horticultural Technology, Chungbuk National Univ., Cheong-ju 361-763, Korea Republic.
SOURCE: Plant biotechnology and in vitro biology in the 21st century. Proceedings of the IXth International Congress of the International Association of Plant Tissue Culture and Biotechnology, Jerusalem, Israel, 14-19 June 1998, (**1999**) pp. 329-332.
Current Plant Science and Biotechnology in Agriculture Vol. 36. 7 ref.
Publisher: Kluwer Academic Publishers. Dordrecht
Meeting Info.: Plant biotechnology and in vitro biology in the 21st century. Proceedings of the IXth International Congress of the International Association of Plant Tissue Culture and Biotechnology, Jerusalem, Israel, 14-19 June 1998.
ISBN: 0-7923-5826-0
PUB. COUNTRY: Netherlands Antilles
DOCUMENT TYPE: Conference Article
LANGUAGE: English
AB The use of a **bioreactor** for the production of ginsenosides by adventitious root cultures of Panax **ginseng** was investigated. Three **bioreactors** were used: a non-stirred jar, a rotation drum and a column with an inner sieve (20, 10 and 2 litres, respectively). Results for the non-stirred, jar **bioreactor** showed that it was effective for the removal of used medium or the supply of fresh medium without subculture and the risk of contamination. Most of the ammonium in the medium was used within 2 weeks while the nitrate was used relatively slowly, indicating that ammonium is used preferentially for root growth.

Root growth was also promoted by increasing the sucrose concentration, with a maximum saponin production obtained from 5-7% sucrose. Total ginsenoside contents of callus, adventitious root cultures and roots of 6-year-old plants were 858, 1477 and 4785 mg/100 g DW, respectively.

L7 ANSWER 7 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 2000:10977 CABA
DOCUMENT NUMBER: 20000305952
TITLE: High density cultivation of Panax notoginseng cells in stirred **bioreactors** for the production of **ginseng** biomass and **ginseng** saponin
AUTHOR: Zhong JianJiang; Chen Feng; Hu WeiWei; Zhong, J. J.; Chen, F.; Hu, W. W.
CORPORATE SOURCE: State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology, Shanghai 200237, China.
SOURCE: Process Biochemistry, (**2000**) Vol. 35, No. 5, pp. 491-496. 25 ref.
ISSN: 0032-9592
DOCUMENT TYPE: Journal
LANGUAGE: English
AB A novel centrifugal impeller **bioreactor** (CIB) was used for high-density suspension cultivation of P. notoginseng [P. pseudoginseng var. notoginseng] cells. Its performance was compared with those of a conventional turbine reactor (TR) and a shake flask (SF). The highest cell densities were 28.9, 26 and 22.7 g/litre (by dry weight) in SF, CIB and TR, respectively; and their corresponding biomass productivities were 1103, 900 and 822 mg/(l.day). The total production of **ginseng** saponin reached about 0.92, 0.80, and 0.49 g/litre in SF, CIB and TR, respectively, and their corresponding saponin productivity was 34, 29 and 21 mg/litre per day. High cell densities (>20 g/litre) were produced in the stirred reactors. From the viewpoint of biomass production and saponin accumulation, CIB was better than TR, and SF results can be well reproduced in CIB.

L7 ANSWER 8 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 95:144623 CABA
DOCUMENT NUMBER: 951608553
TITLE: Biotechnological applications of plant cultures
AUTHOR: Shargool, P. D. [EDITOR]; Ngo, T. T. [EDITOR]
CORPORATE SOURCE: University of Saskatchewan, Saskatoon, Saskatchewan, Canada.
SOURCE: Biotechnological applications of plant cultures, (**1994**) pp. 214. ref. at ends of chapters, Current Topics in Plant Molecular Biology Series.
Publisher: CRC Press Inc. Boca Raton
ISBN: 0-8493-8262-9
PUB. COUNTRY: United States
DOCUMENT TYPE: Book
LANGUAGE: English
AB This multi-authored volume contains state of the art reviews on current techniques in the field of plant culture. The 9 chapters cover 4 main areas: production of secondary metabolites by plant cells (**ginseng**

production in Panax **ginseng** [P. pseudoginseng] cells, and use of fungal elicitors to increase secondary metabolite production); plant cell transformation techniques (bombardment with microprojectiles, and transformation of legumes using Agrobacterium tumefaciens); breeding and micropropagation techniques; and plant cell and tissue **bioreactor** design.

L7 ANSWER 9 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 94:7380 CABA
DOCUMENT NUMBER: 941600250
TITLE: Growth pattern and ginsenoside production of Agrobacterium-transformed Panax **ginseng** roots
AUTHOR: Inomata, S.; Yokoyama, M.; Gozu, Y.; Shimizu, T.; Yanagi, M.
CORPORATE SOURCE: Shiseido Basic Research Laboratories, 1050 Nippa-cho, Kohoku-ku, Yokohama 223, Japan.
SOURCE: Plant Cell Reports, (**1993**) Vol. 12, No. 12, pp. 681-686. 21 ref.
ISSN: 0721-7714
DOCUMENT TYPE: Journal
LANGUAGE: English
AB P. **ginseng** [P. pseudoginseng] roots transformed using A. rhizogenes grew rapidly in a hormone-free medium. Transformed roots showed biphasic growth; rapid during the first two weeks and slower thereafter. Almost all sucrose in the medium was converted to glucose and fructose during the first two weeks, and root growth rate was reduced after sucrose depletion. Replacement of the medium once a week maintained the high growth rate, and the dry weight increased 31-fold in 32 days, the highest growth rate reported so far for **tissue cultures** of **ginseng**. The change of medium also increased the ginsenoside content in the roots. Effective scaling-up of the root culture was achieved in a turbine-blade type **bioreactor**.

L7 ANSWER 10 OF 25 CABA COPYRIGHT 2003 CABI
ACCESSION NUMBER: 89:135822 CABA
DOCUMENT NUMBER: 890394092
TITLE: Biotechnology in agriculture and forestry 4. Medicinal and aromatic plants 1
AUTHOR: Bajaj, Y. P. S. [EDITOR]
SOURCE: Biotechnology in agriculture and forestry 4. Medicinal and aromatic plants 1, (**1988**) pp. xix + 550. many ref.
Publisher: Springer-Verlag. Berlin
ISBN: 3-540-18414-7; 0-387-18414-7
PUB. COUNTRY: Germany, Federal Republic of
DOCUMENT TYPE: Book
LANGUAGE: English
AB This volume comprises 29 chapters grouped into 3 sections. Section 1 is entitled Micropropagation, immobilization, cryopreservation, **bioreactors**, production of secondary metabolites, and its impact on pharmacy. Section 2, Production of medicinal and aromatic compounds by plant cell cultures, includes chapters on Lithospermum erythrorhizon, Rubia cordifolia, Papaver spp., Coffea spp. and Thalictrum spp. Section 3, Biotechnology of medicinal plants, has chapters on Cannabis sativa, Centaurium erythraea, Cinchona spp., Digitalis spp., Duboisia spp., Hypoxis spp., Ochrosia spp., Paeonia spp., Panax **ginseng** [P.

pseudoginseng], Rehmannia glutinosa, Rhamnus spp. and Rhazya stricta. The book is intended as a reference for advanced students and research scientists in plant biotechnology, pharmacognosy, phytochemistry, **tissue culture**, botany and agriculture.

L7 ANSWER 11 OF 25 BIOBUSINESS COPYRIGHT 2003 BIOSIS
ACCESSION NUMBER: 93:57082 BIOBUSINESS
DOCUMENT NUMBER: 0555728
TITLE: Continuous production of glycosides by a **bioreactor** using **ginseng** hairy root culture.
AUTHOR: YOSHIKAWA T; ASADA Y; FURUYA T
CORPORATE SOURCE: SCH. PHARMACEUTICAL SCI., KITASATO UNIV., 5-9-1 SHIROKANE, MINATO-KU, TOKYO 108, JPN.
SOURCE: APPLIED MICROBIOLOGY AND BIOTECHNOLOGY, (**1993**) VOL.39, NO.4-5, P.460-464.
FILE SEGMENT: NONUNIQUE
LANGUAGE: ENGLISH
AB **Ginseng** (Panax **ginseng**) hairy-root culture, established by transformation with the Ri plasmid of Agrobacterium rhizogenes, had a higher potential to biotransform (RS)-2-phenylpropionic acid (PPA) to (RS)-2-phenylpropionyl .beta.-D-glucopyranoside (1) (71% conversion ratio), (2RS)-2-O-(2-phenylpropionyl)-D-glucose (2) (8%), (2S)-2-phenylpropionyl 6-O-.beta.-D-xylopyranosyl-.beta.-D-glucopyranoside (3) (10%) and a myo-inositol ester of (R)-2-phenylpropionic acid (4) (5%). Moreover, the hairy root excreted about a half of the conversion products, 46.8%. The continuous glycosylation of PPA was carried out using a **bioreactor** with **ginseng** hairy root, and the continuous long-term reaction for 2 months was successfully made at a high conversion ratio, 30% or more on average.

L7 ANSWER 12 OF 25 BIOBUSINESS COPYRIGHT 2003 BIOSIS
ACCESSION NUMBER: 92:88448 BIOBUSINESS
DOCUMENT NUMBER: 0493501
TITLE: Problems of optimisation of plant cell culture processes.
AUTHOR: LIPSKY A K
CORPORATE SOURCE: TIMIRYAZEV INST. PLANT PHYSIOLOGY, ACAD. SCI., BOTANICAL STR. 35, 127 276 MOSCOW, RUSS.
SOURCE: JOURNAL OF BIOTECHNOLOGY, (**1992**) VOL.26, NO.1, P.83-97.
FILE SEGMENT: NONUNIQUE
LANGUAGE: ENGLISH
AB The adoption of plant cell cultures as an industrial process depends greatly on the economics of such a process. The multicycle or draw-fill culture technique is one method for improving the productivity and, hence, cost of a process. Mathematical models have been devised for the functional relationships between the nominal costs of biomass and secondary metabolites and the plant cell growth characteristics in a multicycle growth system. The models were used to evaluate the data obtained with cultures of Dioscorea deltoidea (which produces diosgenin) and Panax **ginseng**, grown in various types of **bioreactors**. The multicycle system gave an increase of 1.5-2 in biomass productivity compared with batch culture, but was probably only commercially viable if the cost of the process in the **bioreactor** was at least 30 times that of the medium and if an inoculum of about 30% of the culture of the previous cycle was left in the **bioreactor**. In the multicycle

system incompletely utilized nutrient or metabolite accumulation can only reach 1.43 times or less that of the initial values. With the P. **ginseng** culture, about 75% of the calculated maximum cell packing density per fresh weight (.apprxeq. 530 g l-1) in this regime was achieved. The possibility of growth in the standard **bioreactor** of a shear sensitive type culture was shown with a marine impeller speed up to 330 cm s-1.

L7 ANSWER 13 OF 25 BIOBUSINESS COPYRIGHT 2003 BIOSIS
ACCESSION NUMBER: 86:31943 BIOBUSINESS
DOCUMENT NUMBER: 0081386
TITLE: PLANT **TISSUE CULTURE** IN BIOTECHNOLOGY.
AUTHOR: FURUYA T
CORPORATE SOURCE: SCH. PHARMACEUTICAL SCI., KITASATO UNIV., 5-9-1 SHIROKANE, MINATO-KU, TOKYO 108, JPN.
SOURCE: YAKUGAKU ZASSHI, (**1986**) VOL.106, NO.10, P.856-866.
FILE SEGMENT: NONUNIQUE
LANGUAGE: JAPANESE
AB Plant **tissue culture** is profitably used in biotechnology today to produce valuable compounds and to rapidly and uniformly propagate economically important plants. The main objective of this review is to outline the advances in the production of medicaments and biochemicals by plant **tissue cultures**. In relation to this objective, the development of newly advanced techniques such as transformation, cell fusion, biotransformation, **bioreactor** with immobilized plant cells, and synthetic seeds, is briefly discussed. Recent studies in my laboratory on the bioconversion of 2-phenylpropionic acid (mainly glycosylation) and l-menthol (glycosylation and hydroxylation) by plant suspension cells, and of codeinone (reduction) by the **bioreactor** with immobilized opium poppy cells, and on the de novo synthesis of stress metabolites in the immobilized licorice cells, are described. The production of Korean **ginseng** and saponin ginsenosides in Korean **ginseng** suspension cells, and of Vitamin E in safflower cells are also discussed.

L7 ANSWER 14 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2001:102879 CAPLUS
DOCUMENT NUMBER: 134:339592
TITLE: Improvement of ginsenoside production by jasmonic acid and some other elicitors in hairy root culture of **ginseng** (Panax **ginseng** c. a. meyer)
AUTHOR(S): Yu, Kee-Won; Gao, Wen-Yuan; Son, Sung-Ho; Paek, Kee-Yoeup
CORPORATE SOURCE: Research Center for the Development of Advanced Horticultural Technology, Chungbuk National University, Cheongju, 361-763, S. Korea
SOURCE: In Vitro Cellular & Developmental Biology: Plant (**2000**), 36(5), 424-428
CODEN: IVCPEO; ISSN: 1054-5476
PUBLISHER: CABI Publishing
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Hairy root cultures of Panax **ginseng**, established after the infection of root sections with Agrobacterium rhizogenes KCTC 2703, were cultured in phytohormone-free Murashige and Skoog (MS) liq. medium contg. different concns. of jasmonic acid and some other elicitors, in order to promote ginsenoside accumulation. Jasmonic acid in the range 1.0-5.0 mg

l-1 (4.8-23.8 .mu.M) strongly improved total ginsenoside prodn. in **ginseng** hairy roots. Peptone (300 mg l-1) also showed some effect on ginsenoside improvement; however its effect was much weaker than that of jasmonic acid. Ginsenoside content and productivity were 58.65 and 504.39 mg g-1, resp. The Rb group of ginsenoside content was increased remarkably by jasmonic acid, while Rg group ginsenoside content changed only slightly compared to controls. However, jasmonic acid also strongly inhibited **ginseng** hairy root growth.

REFERENCE COUNT: 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS
RECORD. ALL CITATIONS AVAILABLE IN THE RE
FORMAT

L7 ANSWER 15 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:821325 CAPLUS
DOCUMENT NUMBER: 134:161940
TITLE: Production of **ginseng** saponins by cell suspension cultures of Panax notoginseng in **bioreactors**
AUTHOR(S): Zhong, J. J.
CORPORATE SOURCE: State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology, Shanghai, 200237, Peop. Rep. China
SOURCE: Proceedings of the Phytochemical Society of Europe (**2000**), 45(Saponins in Food, Feedstuffs and Medicinal Plants), 163-170
CODEN: APPEDR; ISSN: 0309-9393
PUBLISHER: Kluwer Academic Publishers
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Suspension cells of Panax notoginseng were used for the prodn. of **ginseng** biomass, **ginseng** saponin and **ginseng** polysaccharide. High d. **bioreactor** cultivation of notoginseng cells was extensively studied to enhance the process productivity. The effects of conditioned medium addn. combined with modified medium and the heterogeneity of **ginseng** saponins were also investigated in **bioreactors**.
REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS
RECORD. ALL CITATIONS AVAILABLE IN THE RE
FORMAT

L7 ANSWER 16 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:264062 CAPLUS
DOCUMENT NUMBER: 133:57600
TITLE: Application of **bioreactor** for the production of saponin by adventitious root cultures in Panax **ginseng**
AUTHOR(S): Seon, J. H.; Yoo, K. W.; Cui, Y. Y.; Kim, M. H.; Lee, S. J.; Son, S. H.; Paek, K. Y.
CORPORATE SOURCE: Research Center for the Development of Advanced Horticultural Technology, Chungbuk National Univ., Cheong-ju, 361-763, S. Korea
SOURCE: Current Plant Science and Biotechnology in Agriculture
(**1999**), 36(Plant Biotechnology and In Vitro Biology in the 21st Century), 329-332
CODEN: CPBAE2; ISSN: 0924-1949
PUBLISHER: Kluwer Academic Publishers
DOCUMENT TYPE: Journal; General Review

LANGUAGE: English
AB A review with 7 refs.
REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE
FORMAT

L7 ANSWER 17 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2000:61038 CAPLUS
DOCUMENT NUMBER: 132:165151
TITLE: Production of steroids and saponins
AUTHOR(S): Wagle, Anupama; Kelkar, G. D.; Heble, M. R.
CORPORATE SOURCE: KETs Scientific Research Centre, Mumbai, 400081, India
SOURCE: Biotechnology (**1999**), 219-239. Editor(s): Ramawat, K. G.; Merillon, J. M. Science Publishers: Enfield, N. H.
CODEN: 68OPA9
DOCUMENT TYPE: Conference; General Review
LANGUAGE: English
AB A review with 67 refs. is given on the prodn. of steroids and saponins from natural resources, marginal cultivation, and plant cell and **tissue culture**. The saponins diosgenin, hecogenin, glycyrrhizin, aescin, and **ginseng**, the cardiac glycosides digoxin, digitoxin, ouabain, proscillaridin, and other steroids are described, their biol. activity is outlined and their plant sources and isolation methods are described. In conclusion, plant tissue and cell culture methods have considerable scope in developing viable technologies both for the prodn. of elite plants and for the prodn. of active steroidal constituents using cells in **bioreactor** systems.
REFERENCE COUNT: 67 THERE ARE 67 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE
FORMAT

L7 ANSWER 18 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:644281 CAPLUS
DOCUMENT NUMBER: 131:335868
TITLE: Combined effects of initial sucrose concentration and inoculum size on cell growth and **ginseng** saponin production by suspension cultures of Panax **ginseng**
AUTHOR(S): Akalezi, C. O.; Liu, S.; Li, Q. S.; Yu, J. T.; Zhong, J. J.
CORPORATE SOURCE: State Key Laboratory of Bioreactor Engineering, East China University of Science and Technology, Shanghai, 200237, Peop. Rep. China
SOURCE: Process Biochemistry (Oxford) (**1999**), 34(6,7), 639-642
CODEN: PBCHE5; ISSN: 1359-5113
PUBLISHER: Elsevier Science Ireland Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English
AB Cell growth and **ginseng** saponin prodn. by suspension cultures of Panax **ginseng** were investigated under various initial sucrose concns. and inoculum sizes. Cell growth was low at a low inoculum size of 1.5 g DW/l, and the max. cell growth rate was obtained at 3 g DW/l of inoculum size. A cell d. of 22.4 g/l was obtained at inoculum size of 6 g

DW/l and initial sucrose concn. of 60 g/l after 26 days cultivation. The max. cell yield of 0.83 was obtained at inoculum size of 3 g DW/l and initial sucrose level of 30 g/l. Saponin biosynthesis was stimulated with high initial sucrose concns. (60-80 g/l), and the max. saponin prodn. of 275 mg/l was achieved at 6 g/l of inoculum size and 60 g/l initial medium sucrose. This work is considered to be helpful for efficient large-scale bioprocessing of the **ginseng** cell cultures in **bioreactors**.

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L7 ANSWER 19 OF 25 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 1996:461419 CAPLUS
DOCUMENT NUMBER: 125:110422
TITLE: Mass culture and ginsenoside production of **ginseng** hairy root by two-step culture process
AUTHOR(S): Ko, Kyeong Min; Deol, Chung Yang; Ji, Chang Park; Kang, Ju Choi; Kwang, Tae Choi; Baik, Hwang
CORPORATE SOURCE: Dep. of Biology, Chonnam National Univ., Kwangju, 500-757, S. Korea
SOURCE: Journal of Plant Biology (**1996**), 39(1), 63-69
CODEN: JPBIEZ
PUBLISHER: Botanical Society of Korea
DOCUMENT TYPE: Journal
LANGUAGE: Korean

AB A hairy root clone of Panax **ginseng** was cultured in various conditions with 3 L bubble type **bioreactor** to enhance both growth and ginsenoside prodn. The hairy roots were more rapidly grown under the dark condition than under the light condition. However, total amt. of ginsenoside of hairy roots cultures under the light for 30 days increased 2 folds as compared with the dark condition and was 1.10% based on 6 ginsenosides. Esp., ginsenoside-Re was significantly increased and some ginsenosides except for ginsenoside-Re was slightly reduced. Also, the growth of hairy roots decreased about 30% as compared with the dark condition. In contrast, addn. of sodium acetate led to decreased prodn. of ginsenoside and growth of hairy roots under light condition. The influence of concn. was found to be the most appropriate for growth and ginsenoside prodn. under light condition. Two-step process of hairy roots culture with yeast elicitation or without ammonia in culture medium was developed to enhance growth and ginsenoside synthesis. 50 .mu.G of yeast elicitor per g of fresh wt. showed a synergistic effect on the ginsenoside synthesis of hairy roots on 20 days after culture. At that time, the content of total ginsenoside was 1.15%, while the growth of hairy roots decreased 21% as compared with the dark condition. In addn., when elimination of ammonia on 20 days after culture, the content of total ginsenoside was 1.26% with significant increment of ginsenoside-Rd (0.27%) in addn. to ginsenoside-Re and the growth of hairy roots decreased 10% as compared with the dark condition. In this system, it demonstrated a unique two-step process of hairy root cultures to maximize biomass and secondary metabolites. It was found possibility to enhance ginsenosides prodn. by growing hairy roots in this method.

L7 ANSWER 20 OF 25 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 1993:5671 CAPLUS
DOCUMENT NUMBER: 118:5671
TITLE: Problems of optimization of plant cell culture processes
AUTHOR(S): Lipskii, A. Kh.
CORPORATE SOURCE: K.A. Timiryazev Inst. Plant Physiol., Moscow, 127 276, Russia
SOURCE: Journal of Biotechnology (**1992**), 26(1), 83-97
CODEN: JBITD4; ISSN: 0168-1656
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English

AB The adoption of plant cell cultures as an industrial process depends greatly on the economics of such a process. The multicycle or draw-fill culture technique is one method for improving the productivity and, hence, cost of a process. Math. models have been devised for the functional relations between the nominal costs of biomass and secondary metabolites and the plant cell growth characteristics in a multicycle growth system. The models were used to evaluate the data obtained with cultures of Dioscorea deltoidea (which produces diosgenin) and Panax **ginseng**, grown in various types of **bioreactors**. The multicycle system gave an increase of 1.5-2 in biomass productivity compared with batch culture, but was probably only com. viable if the cost of the process in the **bioreactor** was .gtoreq.30-fold that of the medium and if an inoculum of .apprx.30% of the culture of the previous cycle was left in the **bioreactor**. In the multicycle system, incompletely utilized nutrient or metabolite accumulation can only reach .ltoreq.1.43-fold that of the initial values. With the P. **ginseng** culture, about 75% of the calcd. max. cell packing d. per fresh wt. (.apprx.530 g/L) in this regime was achieved. The possibility of growth in the std. **bioreactor** of a shear sensitive type culture was shown with a marine impeller speed up to 330 cm/s.

L7 ANSWER 21 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1992:192641 CAPLUS
DOCUMENT NUMBER: 116:192641
TITLE: Saponins manufacture enhancement with Panax using fermentor having built-in turbine
INVENTOR(S): Inomata, Shinji; Yokoyama, Mineyuki; Aitsu, Yoko; Yanagi, Mitsuo; Seto, Susumu; Shimizu, Toshiaki; Sakae, Shotaro; Murata, Kazuhiko
PATENT ASSIGNEE(S): Shiseido Co., Ltd., Japan; Chiyoda Seisakusho K. K.
SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
JP 03285690	A2	19911216	JP 1990-86897	19900330	<--
JP 3078820	B2	20000821			

PRIORITY APPLN. INFO.: JP 1990-86897 19900330

AB The saponins (I) manuf. is enhanced by culturing the Agrobacterium rhizogenes-infected P. **ginseng** root in a fermentor possessing built-in turbine(s) and further enhanced by regular replacement with fresh

medium. Culture of P. **ginseng** root infected with A. rhizogenes ATCC15834 for manuf. of I in a 2-L **bioreactor** (Chiyoda machinery). The prodn. fo I with the medium was 3.apprx.8-fold higher than that of using an air-lift fermentor.

L7 ANSWER 22 OF 25 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1985:3178 CAPLUS
DOCUMENT NUMBER: 102:3178
TITLE: Recent advances in plant **tissue culture**
AUTHOR(S): Furuya, Tsutomu
CORPORATE SOURCE: Sch. Pharm. Sci., Kitasato Univ., Tokyo, Japan
SOURCE: Yukagaku (**1984**), 33(10), 666-71
CODEN: YKGKAM; ISSN: 0513-398X
DOCUMENT TYPE: Journal; General Review
LANGUAGE: Japanese
AB A review with 12 refs., discussing prodn. of plant components, **bioreactors** using immobilized plant cells, and prodn. of **ginseng** by **tissue culture**.

L7 ANSWER 23 OF 25 SCISEARCH COPYRIGHT 2003 ISI (R)
ACCESSION NUMBER: 93:479022 SCISEARCH
THE GENUINE ARTICLE: LP687
TITLE: STUDIES ON PLANT-**TISSUE CULTURE** .84. CONTINUOUS PRODUCTION OF GLYCOSIDES BY A **BIOREACTOR** USING **GINSENG** HAIRY ROOT CULTURE
AUTHOR: YOSHIKAWA T; ASADA Y; FURUYA T (Reprint)
CORPORATE SOURCE: KITASATO INST, SCH PHARMACEUT SCI, 5-9-1 SHIROKANE, MINATO KU, TOKYO 108, JAPAN
COUNTRY OF AUTHOR: JAPAN
SOURCE: APPLIED MICROBIOLOGY AND BIOTECHNOLOGY, (**JUL 1993***)
Vol. 39, No. 4-5, pp. 460-464.
ISSN: 0175-7598.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE; AGRI
LANGUAGE: ENGLISH
REFERENCE COUNT: 14
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS
AB ***Ginseng** (Panax **ginseng**) hairy-root culture, established by transformation with the Ri plasmid of Agrobacterium rhizogenes, had a higher potential to biotransform (RS)-2-phenylpropionic acid (PPA) to (RS)-2-phenylpropionyl beta-D-glucopyranoside (1) (71% conversion ratio), (2RS)-2-O-(2-phenylpropionyl)-D-glucose (2) (8%), (2S)-2-phenylpropionyl 6-O-beta-D-xylopyranosyl-beta-D-glucopyranoside (3) (10%) and a myo-inositol ester of (R)-2-phenylpropionic acid (4) (5%). Moreover, the hairy root excreted about a half of the conversion products, 46.8%. The continuous glycosylation of PPA was carried out using a **bioreactor** with **ginseng** hairy root, and the continuous long-term reaction for 2 months was successfully made at a high conversion ratio, 30% or more on average.

L7 ANSWER 24 OF 25 USPATFULL
ACCESSION NUMBER: 2002:19090 USPATFULL
TITLE: Anti-proliferative preparations
INVENTOR(S): Soudant, Etienne, Fresnes, FRANCE

Bezalel, Lea, Beer Sheva, ISRAEL
Ziv, Meira, Rehovot, ISRAEL
Perry, Inon, Tel Aviv, ISRAEL
PATENT ASSIGNEE(S): I.B.R. Israeli Biotechnology Research, Ltd., Tel Aviv, ISRAEL (non-U.S. corporation)

	NUMBER	KIND	DATE		
PATENT INFORMATION:	US 6342254	B1	20020129		
	WO 9836761		19980827		<--
APPLICATION INFO.:	US 1999-367898		19991129	(9)	
	WO 1998-IL85		19980223		
			19991129	PCT 371 date	

	NUMBER	DATE
PRIORITY INFORMATION:	IL 1997-120291	19970223
	IL 1997-120292	19970223
	IL 1997-12320	19970716

DOCUMENT TYPE: Utility
FILE SEGMENT: GRANTED
PRIMARY EXAMINER: Tate, Christopher R.
LEGAL REPRESENTATIVE: Nath & Associates, Nath, Gary M., Juneau, Todd L.
NUMBER OF CLAIMS: 23
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 26 Drawing Figure(s); 17 Drawing Page(s)
LINE COUNT: 1706

AB A dormant preparation (DC) is provided which is capable of inhibiting proliferation of various kinds of cells. The preparation comprises an extract which is obtained from cells or tissue originating in an organism capable of entering a phase of dormancy in at least one of its parts and comprises at least one substance which induces or maintains the state of dormancy in the organism from which the cells or tissue are derived. The DC may be used for a variety of indications including human medicine and cosmetics, plant growth control and food preservation. A preferred dormant preparation is prepared from a water extract of Narcissus (daffodil) bulb.

L7 ANSWER 25 OF 25 USPATFULL
ACCESSION NUMBER: 1998:14697 USPATFULL
TITLE: Cultured cells of quillaja sp
INVENTOR(S): Dalsgard, Kristian, Kalvehave, Denmark
Henry, Max, Toulouse, France
PATENT ASSIGNEE(S): Seed Capital Investment (SCI) B.V., Utrecht, Netherlands (non-U.S. corporation)

	NUMBER	KIND	DATE		
PATENT INFORMATION:	US 5716848		19980210		<--
	WO 9003184		19900405		<--
APPLICATION INFO.:	US 1995-424449		19950807	(8)	
	WO 1993-NL220		19931029		
			19950807	PCT 371 date	
			19950807	PCT 102(e) date	

	NUMBER	DATE

PRIORITY INFORMATION: EP 1992-203365 19921030
NL 1992-2117 19921207
DOCUMENT TYPE: Utility
FILE SEGMENT: Granted
PRIMARY EXAMINER: Rollins, John W.
LEGAL REPRESENTATIVE: O'Connor, ChristensenJohnson & Kindness PLLC
NUMBER OF CLAIMS: 18
EXEMPLARY CLAIM: 1
NUMBER OF DRAWINGS: 5 Drawing Figure(s); 4 Drawing Page(s)
LINE COUNT: 560

AB The present invention relates to cultured cells of Quillaja sp. For the preparation of active substances from Quillaja sp., such as saponins. The cells may either originate from a callus **tissue culture** or from a suspension cell culture. Preferred Quillaja sp. are species selected from the group consisting of Quillaja saponaria Molina, Quillaja smegmadermos, Quillaja brasiliesis. The invention further relates to active substances extracted from cultured cells of Quillaja sp. and to preparations comprising these active substances, or a non-dialysable or a dialysable fraction thereof, to methods for preparing the active substances and to various agents, comprising the dialyzable and/or the non-dialysable fraction of an extract of cultured cells of Quillaja sp. And having various properties.

=> FIL STNGUIDE

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	112.84	113.05

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)	SINCE FILE ENTRY	TOTAL SESSION
CA SUBSCRIBER PRICE	-5.86	-5.86

FILE 'STNGUIDE' ENTERED AT 09:36:14 ON 23 APR 2003

FILE CONTAINS CURRENT INFORMATION.
LAST RELOADED: Apr 18, 2003 (20030418/UP).

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